

Appl. No. 10/696,151
Amdt. dated December 16, 2004
Reply to Office action of September 28, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A DRAM cell comprising:
 - a semiconductor substrate;
 - a trench extending into the substrate;
 - a cell capacitor disposed in a bottom portion of the trench;
 - a cell transistor disposed in a top portion of the trench above the cell capacitor;
 - a node conducting element connecting the cell capacitor to the cell transistor; and
 - a collar disposed about the node conducting element between the cell transistor and the cell capacitor;

wherein:

the collar is disposed in the substrate, at least partially outside of the trench, between the cell capacitor and the cell transistor;

further comprising:

a strap disposed in the trench and having an outside peripheral surface; and

the collar is laterally adjacent and surrounds the outside peripheral surface of the buried strap.
2. (original) A DRAM cell, according to claim 1, wherein:
the collar is disposed substantially outside of the trench.
3. (original) A DRAM cell, according to claim 1, wherein:
the collar is disposed wholly outside of the trench
4. (original) A DRAM cell, according to claim 1, further comprising:
a strap disposed between the node conducting element and the cell transistor.

Appl No. 10/696,151

Amdt. dated December 16, 2004

Rcply to Office action of September 28, 2004

5. (original) A DRAM cell, according to claim 1, further comprising:
a strap which is self-aligned with the collar.
6. (original) A DRAM cell, according to claim 1, further comprising:
a strap disposed in the trench at substantially a same depth as the collar.
7. (original) A DRAM cell, according to claim 1, further comprising:
a strap disposed in the trench and laterally surrounded by the collar.
8. (canceled) A DRAM cell, according to claim 1, further comprising:
~~a strap disposed in the trench and having a periphery; and~~
~~the collar is laterally adjacent and surrounds the periphery of the buried strap.~~
9. (currently amended) A DRAM cell, according to claim 1, comprising:
~~a semiconductor substrate;~~
~~a trench extending into the substrate;~~
~~a cell capacitor disposed in a bottom portion of the trench;~~
~~a cell transistor disposed in a top portion of the trench above the cell capacitor;~~
~~a node conducting element connecting the cell capacitor to the cell transistor; and~~
~~a collar disposed about the node conducting element between the cell transistor and the~~
~~cell capacitor; and~~
~~a strap;~~
wherein:
the strap is embedded into a top surface of the collar.
10. A DRAM cell, according to claim 9, wherein:
the strap extends no higher than the collar.
11. (canceled) A DRAM cell, according to claim 9, wherein:

Appl. No. 10/696,151

Amdt. dated December 16, 2004

Reply to Office action of September 28, 2004

~~the strap is has a periphery which is laterally surrounded by the collar.~~

12. (currently amended) A method of forming DRAM cells, comprising:
forming trenches in a semiconductor substrate;
forming cell capacitors in a bottom portion of the trench;
forming cell transistors in a top portion of the trench; and
for each DRAM cell, providing a collar between the cell capacitor and the cell transistor,
the collar being disposed in the substrate, at least partially outside of the trench;
for each DRAM cell, forming a recess in a top inside corner of the collar; and
for each DRAM cell, embedding a strap in the recess.
13. (currently amended) A method, according to claim 12, wherein:
the collar is disposed at least substantially outside of the trench.
14. (currently amended) A method, according to claim 12, wherein:
the collar is disposed wholly outside of the trench.
15. (canceled) A method, according to claim 12, further comprising:
~~for each DRAM cell, providing a node conducting element between the cell capacitor and the cell transistor;~~
wherein:
~~the collar is disposed laterally adjacent the node poly element.~~
16. (canceled) A method, according to claim 12, further comprising:
~~for each DRAM cell, providing a node conducting element between the cell capacitor and the cell transistor;~~
wherein:
~~the collar surrounds a periphery of the node poly element.~~

Appl. No. 10/696,151

Amdt. dated December 16, 2004

Reply to Office action of September 28, 2004

17. (canceled) A method, according to claim 12, further comprising:
for each DRAM cell, providing a node conducting element between the cell capacitor and the cell transistor; and
a strap disposed between the node conducting element and the cell transistor.
18. (canceled) A method, according to claim 12, further comprising:
for each DRAM cell, providing a strap which is self-aligned with the collar.
19. (currently amended) A method, according to claim 12, [further comprising:
for each DRAM cell, disposing a strap in the trench at substantially a same depth as the collar]
wherein the strap extends no higher than the collar.
20. (original) A method, according to claim 12, further comprising:
for each DRAM cell, disposing a strap in the trench; and
the strap is laterally surrounded by the collar.

Please enter the following:

21. (new) A DRAM cell, according to claim 1, further comprising:
a recess disposed in a top inside corner of the collar; and
the strap extends into the recess in the top inside corner of the collar.
22. (new) A DRAM cell, according to claim 1, wherein:
the strap is fully vertically embedded in the collar and it is laterally surrounded by the collar.
23. (new) A DRAM cell, according to claim 1, wherein:
the strap is disposed in the trench at substantially a same depth as the collar; and

Appl. No. 10/696,151
Amdt. dated December 16, 2004
Reply to Office action of September 28, 2004

the collar extends deeper into the trench than the strap and covers a bottom surface of the strap.

24. (new) A DRAM cell, according to claim 1, wherein:
the collar covers a bottom surface of the strap.
25. (new) A method, according to claim 12, wherein:
constraining outward diffusion of the strap by the laterally-surrounding collar; and
constraining downward diffusion of the strap with the collar.
26. (new) A method, according to claim 12, wherein:
an upper surface of the buried strap does not extend above an upper surface of the collar.